is well known. Abnormal variations in thyroid activity over long periods may easily result in organic changes in the circulatory mechanism where only functional disturbances were produced in the early stages of the disease. The observations made by the authors indicate such a relationship between duration of abnormal thyroid activity and permanency of change in the vascular system.

Having these things in mind should be a valuable aid in the study of patients presenting such problems.

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JOHN C. RUDDOCK, M. D. (1930 Wilshire Boulevard, Los Angeles).—Statistics of this character are very valuable to the advancement of medical practice. In addition, these figures help with others of like nature to dispel various axioms and dogmatic statements concerning the phenomena associated with thyroid dysfunction.

Abnormal blood pressure is a symptom which may be due to a great many factors other than thyroid disease. However, we are dealing in this paper only with those patients who have an additional factor, namely, goiter. It has been shown by other authors that the effect of the thyroid on the heart is through the sympathetic nervous system, and that the symptomatic phenomena accompanying thyroid disease (exophthalmic goiter and toxic adenoma) are identical to those found in sympathetic neurosis.

In the goiter patient we have three additional factors which are not found in patients without goiters:

1. Heart hurry (tachycardia).
2. Vasomotor instability.
3. Toxicosis (thyroid).

The authors have called attention to the vasomotor instability as being responsible for lowered diastolic pressure, and have called attention to work by Blackford, Sandiford, and others, concerning the effect of injecting toxic thyroid extracts, and producing only a transient depressor effect.

With all other factors remaining normal, heart hurry (tachycardia) alone is all-important in the height of systolic pressures. It is true that tachycardia may also be, in certain instances, a compensatory phenomenon, when there is a sudden lowering of blood pressure due to a dilated venous circulation as may occur in shock. Tachycardia, however, in thyroid disease is a result of the sympathetic accelerator action from a thyrotoxicosis. I believe that further study of blood pressures in exophthalmic goiters will show that the systolic pressures are in a direct ratio to the pulse rate. This, however, could not apply to toxic adenomas because of the other multitudinous factors, aside from thyroid disease, which enter into the question of hypertension. Doctors Toland and Askey should be complimented on this report, which I feel is only preliminary to a much more extensive one on the same subject.

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DOCTORS ASKEY AND TOLAND (Closing).—The point we particularly wish to bring out is that there is no "typical" blood pressure in thyrotoxicosis. It may be accompanied by hypotension, normal blood pressure, or hypertension. Apparently the majority (62 per cent in our series) have normal pressure. The most of these were adenomatous patients and definitely toxic.

Many, however, were of the exophthalmic type, and failed to show the so-called typical lowering of the diastolic pressure and elevation of the systolic pressure.

The peculiar selectivity by which the thyroid toxin produces hypotension in one individual and hypertension in another has not yet been adequately explained by the physiologists. The discussion has emphasized the better prognosis for reduction of hypertension after thyroidectomy in exophthalmic goiter.

We believe, as does Doctor Ruddock, that tachycardia is largely responsible for hypertension in the exophthalmic goiter patient.

RETROBULBAR NEURITIS AND MULTIPLE SCLEROSIS

SOME OBSERVATIONS WITH QUANTITATIVE CHARTS AND REPORT OF CASE

PART II

By CLIFFORD B. WALKER, M. D.
Los Angeles

DISCUSSION *by Dohrmann K. Pischel, M. D., San Francisco; M. F. Weymann, Los Angeles.*

CASE 2.—Patient came under observation on March 11, 1930. Miss V. E. S. Age, eleven. White.

Complaint.—Sudden blindness in left eye with circumocular pain.

History.—Child has had measles. Chicken-pox, very slight. Never mumps or whooping cough. She is a very athletic, romping youngster, especially as regards basketball and swimming. For two weeks had a "little cold" which took the pleasure out of her games because of tired feeling and leg ache. One week ago, although feeling quite well otherwise, awakened with a dull pain and tenderness in region of left eye and noticed she could hardly see out of left eye. Referred for question of sinus operation. Injury denied. No discoloration of affected parts at any time. X-ray and nose examination already negative by rhinologist.

Fundi show no departure from normal physiological limits, as seen by Dr. La Motte and myself. Color of disks rosy and same in both eyes. Pupils still somewhat dilated from previously used drops.

Vision: Right, 20/30; left, 20/100. Glasses do not improve. Parents and examiners of patient consider vision of right eye as good as ever and unaffected.

Fields: Figures 7 to 9 show both eyes affected in such a way as to suggest that the lesion (neuritis) is probably close to the chiasm or has extended to the chiasm. The fourth or final field on April 18, 1930, was entirely normal within physiologic variations. Space is too limited to reproduce it here. There has been no setback to date.

Comment.—In this case we have apparently the typical field series to be obtained in the typical case of retrobulbar neuritis, outlined in the carefully considered definitions summarized from the literature by Dunphy [15] as a "rather rapid loss of visual acuity, with central scotoma and usually normal but at times varying peripheral fields. There may be pain and tenderness on moving the eyeball. The ophthalmoscopic picture is usually normal. One or both eyes may be affected. There is a definite tendency toward recovery, though in some cases damage is permanent."

It is possible that with the more prevalent use of quantitative perimetry it will be found, as our experience has shown, that the peripheral field can hardly be referred to as normal in most of these patients. To be sure, it is usually normal to ordinary tests, but to the 1/2000 or 2/2000 test objects contractures of the peripheral field are often demonstrable and are frequently more marked on the temporal side at some of the progressive stages. The enlargement of the blind spot may be in this same category that is really a peripheral contracture.

These two cases may be taken as typical of two usual types. The first or more common type in which the central field is depressed first and comes back last, and the second type in which it is depressed last or is more resistant and comes

back first. In addition, the type mentioned in the previous paragraph as a temporal or bitemporal tendency may represent the third group or may be combined with the first two. The recovery period in the ordinary type is seen to vary from three weeks to almost a year. It seems possible to guarantee that a case of retrobulbar neuritis may not finally turn out to be caused by multiple sclerosis. More of these cases because of limitation of space will not be included here,[16] and only for comparison a few instances will be presented which have more notable suggestion of multiple sclerosis.

MULTIPLE SCLEROSIS

Possibly the inclination for certain cases of retrobulbar neuritis to show a tendency to a temporal or bitemporal defects may indicate a more posterior location of the point of maximum inflammation extending sometimes into the chiasm and affecting the crossed fibers more than the uncrossed. Multiple sclerosis may not only imitate these conditions, but may occur quite symmetrically in the chiasm, as first shown by Roenne,[17] so that a chiasmal tumor may be so closely imitated that an exploratory operation may be justifiable in skillful hands.

Just such an instance is beautifully demonstrated in Cushing's monograph,[1] referred to in the beginning of this paper. The following case quite closely parallels that of Doctor Cushing's series in so many respects that it would probably require an explorating operation to make the diagnosis certain.

CASE 3.—Patient came under observation on February 1, 1930. Mr. E. R. N. Age, fifty-nine. White.

Complaint.—Failing vision of both eyes, more in the right.

History.—Ocular discomfort one and one-half years ago led him to change his glasses, but ten months ago definite impairment of vision of right eye was noted, which fell as low as 20/100 six months ago. Physicians could find no other trouble except a few faulty teeth, which were removed. Patient not subject to sinusitis, catarrh, or to colds.

Patient is slightly overweight and skin has just a suggestion of dryness, and yet other stigmata of hypophyseal dystrophy are lacking. Neurological examination is negative except as regards the eyes. X-ray and Wassermann examination are negative. Ocular examination discloses no abnormality except definitely pale optic disks and the field defect shown in Figure 10.

At the time of this writing some fluctuations, but no great change has taken place in the visual field and acuity. Sodium salicylate up to sixty grains a day represents the principal treatment that has been used.

* * *

CASE 4.—Patient came under observation on January 28, 1930. Mrs. H. . K. Age, twenty-eight. Married; no children.

History.—Six weeks ago vision in the right eye failed, in the course of three days, and then remained blind for one week, according to the statements of patient and family physician. Although the eyeball was rather tender to the touch there was no noticeable cold or coryza during or just before this time.

One year ago, during February, patient had paralysis and numbness of right arm, lasting six weeks.

Four years ago (she was thought to have Landry's paralysis) was partially paralyzed from high waist line down, six weeks' duration.

Has had low posterior headaches for many years.

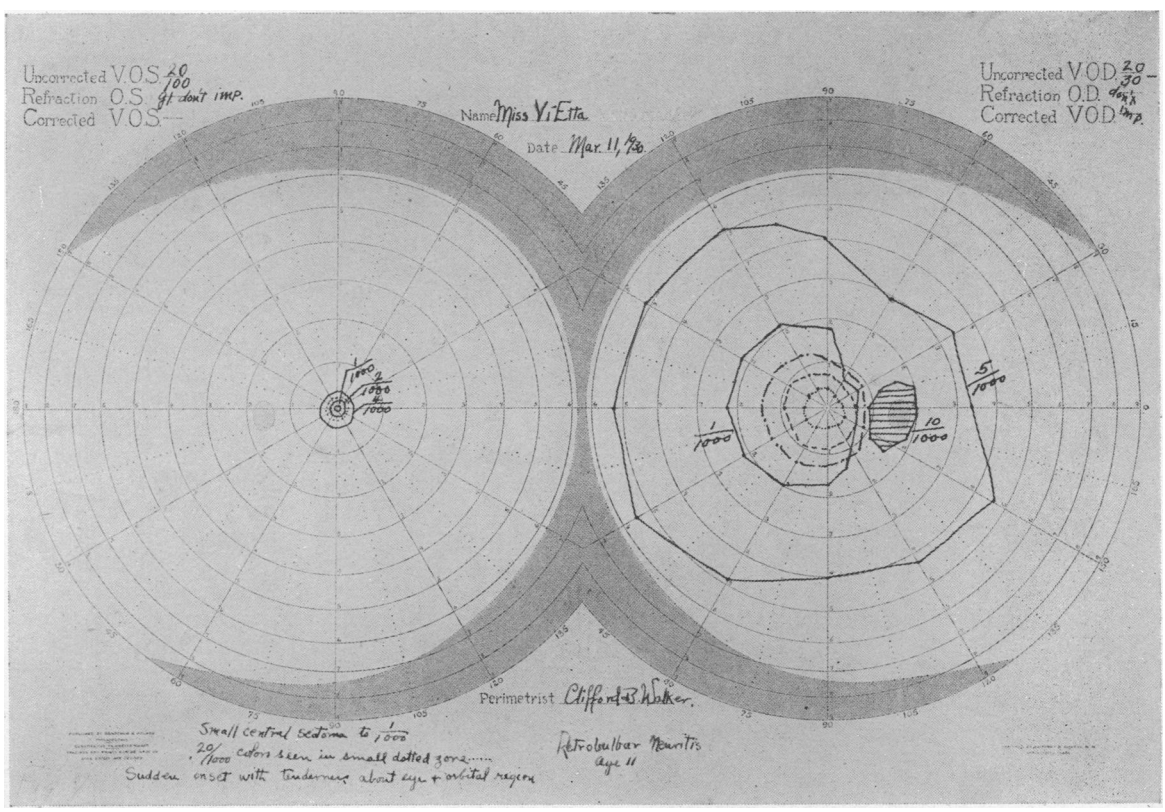

Fig. 7 (Case 2).—Retrobulbar neuritis, seventh day. Right field shows a shrinkage of the temporal field and enlarged blind spot; left field shows a general shrinkage and central depression, yet with preservation of colors, "tubular field."

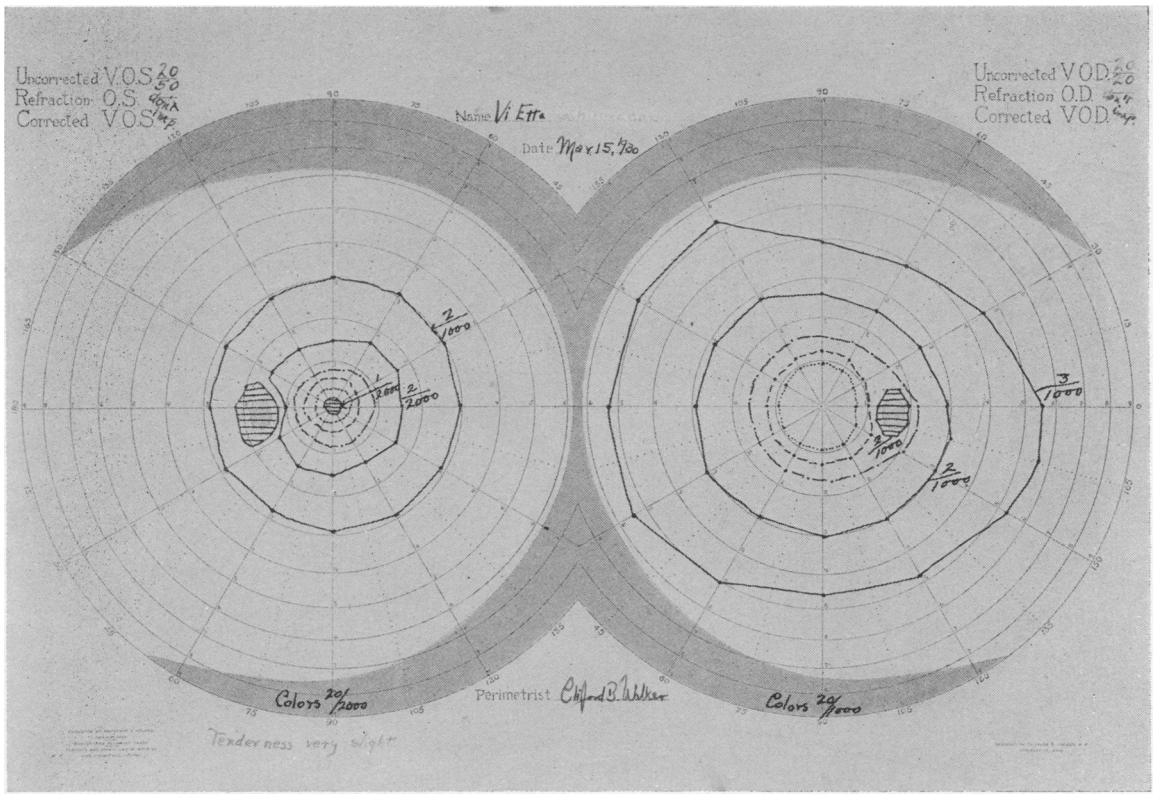

Fig. 8 (Case 2).—Retrobulbar neuritis, eleventh day. Improvement marked under treatment; relatively more rapid in worse eye.

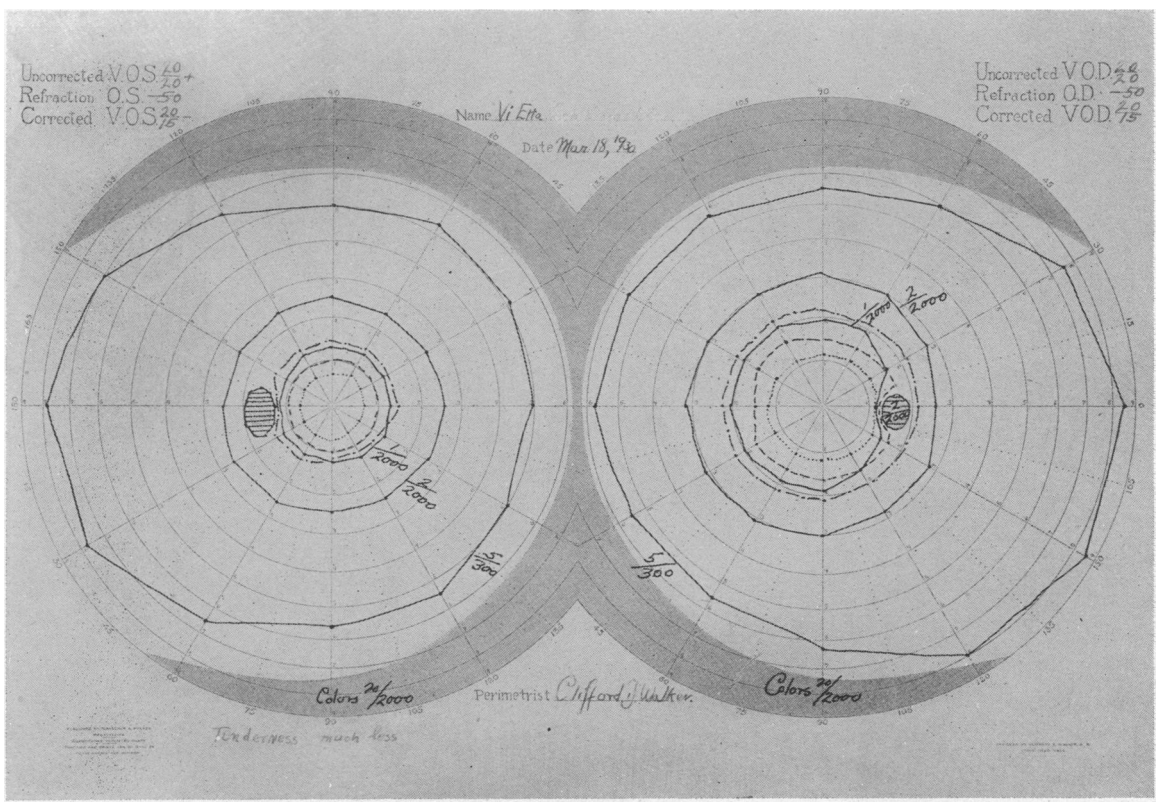

Fig. 9 (Case 2).—Retrobulbar neuritis, fourteenth day. Central vision normal in both eyes. Still some contraction for small visual angles and colors.

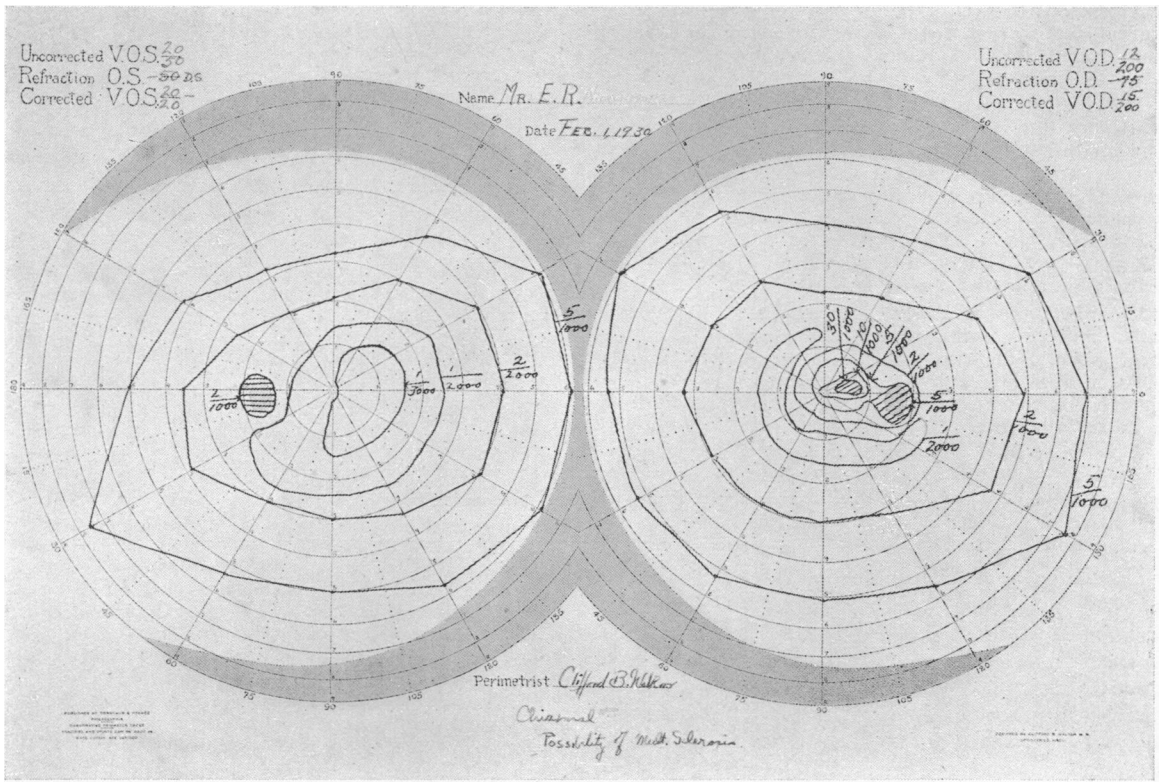

Fig. 10 (Case 3).—Superior bitemporal depression of field very suggestive of tumor (tuberculum sella), but in the absence of every other confirmatory sign of symptom probability of multiple sclerosis (chiasmal) remains.

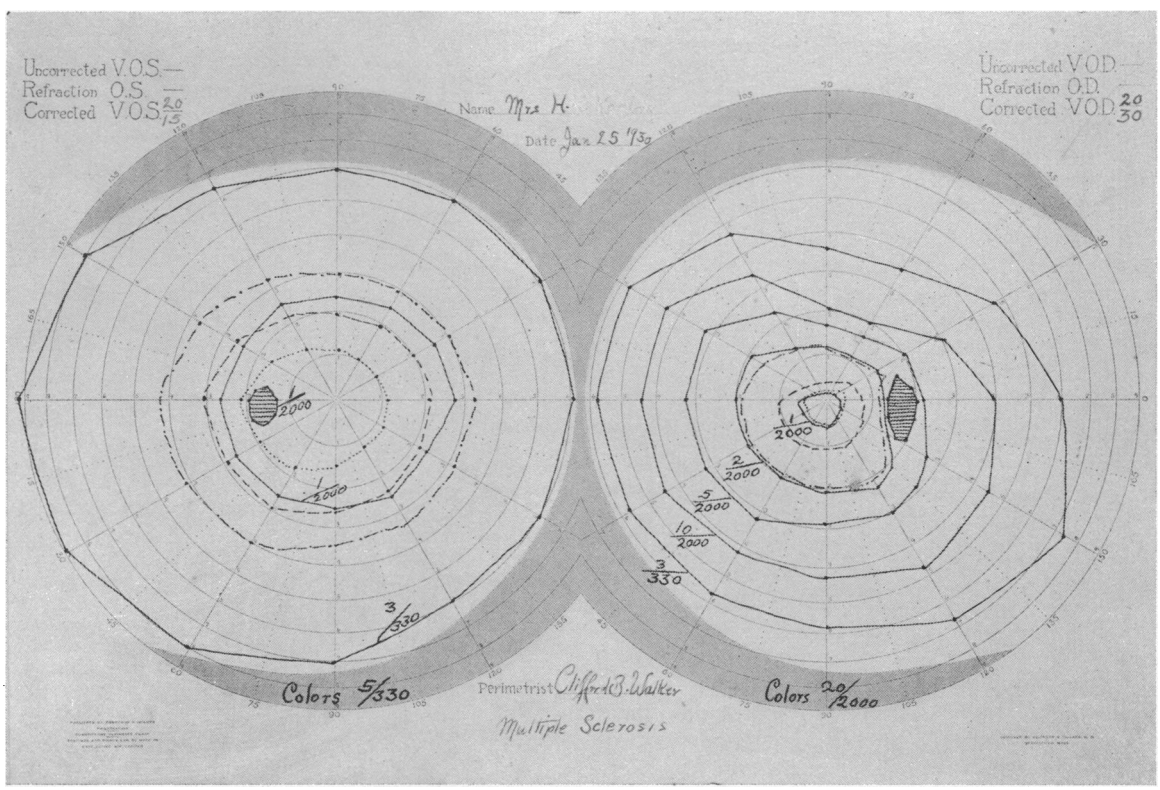

Fig. 11 (Case 4).—Multiple sclerosis. Again the tendency to upper temporal field contracture so commonly seen in retrobulbar neuritis and chiasmal lesions.

At present the vision in the right eye has improved a great deal since the sudden blindness six weeks ago, and a careful field examination is desired with quantitative perimetry to make the diagnosis if possible.

There are no remnants of the previous palsies, and headaches have disappeared under medical treatment. The neurological examination by Dr. Leon Myers was negative. Wassermann, negative. Sinus x-rays were negative, and no calcification granules or bony distortion of the sella could be demonstrated by x-ray (American tubes). No evidence of scanning speech, tremor or nystagmus. Ocular examination disclosed no pain or tenderness to the touch.

No imbalance or limitation of motion of the eyeballs. Anterior and posterior segments of the eyes show normal pictures. Without the history, a perfectly normal appearance of the optic disks would be reported without doubt. Possibly a suggestion of pallor of the right disk. Fundus and tension were normal.

Fields (figure 11) show in the right eye only the peculiar tendency to upper temporal contraction with central depression as in the previous case, though less marked.

Comment.—The symptom complex of multiple sclerosis is not complete in this instance, yet it is perhaps considerably more suggestive than some of the others in which the diagnosis has inclined toward multiple sclerosis. It may take many years before the diagnosis becomes unquestionable, as for instance, in cases with a final confirmatory autopsy as reported by Nielsen, Wilson, and Dieterle.[18] In one of their patients the earliest symptoms were noted forty-seven years before the correct diagnosis was carefully considered, this being done during the last year of the patient's life. The condition probably began at the age of twenty-six at which time deafness in one ear followed by Ménière's syndrome was a complication, in such a way as to indicate that multiple sclerosis could readily have been the cause of that also.

GENERAL OBSERVATIONS

As time goes on the indications are that more cases of retrobulbar neuritis will be transferred to the multiple sclerosis group.

In this series of cases it is notable that two reports have been selected from each group which seem to represent the group not only in characteristics, but also in number; that is, the proportion of 50 per cent each seems to be approximated.

Again the number of cases due to acute purulent involvement of the sinuses is limited in this series to not over four per cent.

A retrobulbar neuritis of more prolonged type (neighborhood of three months' duration without much improvement) must be differentiated from chiasmal lesions and multiple sclerosis. For instance, a question of Leber's disease as well as a Foster Kennedy syndrome, both thought to be of retrobulbar neuritic origin, might require such a differentiation in the early stages.

The nonpurulent instances of retrobulbar neuritis of short recovery period (neighborhood of three to six weeks) must receive a guarded prognosis since time alone may serve to differentiate from multiple sclerosis.

SUMMARY

1. More visual fields must be taken carefully by quantitative methods to render more positive differentiation of the causes of retrobulbar neuritis.

2. A series of quantitative fields, correctly taken by the same person at intervals corresponding to rate of suspected visual change, will be of the greatest value in differential diagnosis.

3. The one- and two-meter Bjerrum screen offers the most rapid and accurate[19] method of obtaining measurements of the finer changes, often not even suggested by ordinary perimetric methods.

410 Auditorium Building, 427 West Fifth Street.

REFERENCES

15. Dunphy. Retrobulbar Neuritis. Arch. Ophth., 3, 208. 1930.

16. A total of twenty cases were presented by stereopticon slides at the annual meeting of the California Medical Association, Del Monte, 1930.

17. Walker, Clifford B. An instance where this occurred also in a case of acute retrobulbar neuritis with pus (proven by x-ray and operation) in the posterior ethmosphenoid group of sinuses has already been reported. Boston M. and S. J., 185, 321, 1921.

18. Nielsen, Wilson, and Dieterle. Pyramido Pallidal Degeneration Syndrome Due to Multiple Sclerosis. Bull. Battle Creek Sanitar. and Hosp. Clin., 25, 28, 1930.

19. Walker, C. B. The Time Element in Quantitative Perimetry. Arch. of Surg., 18, 1036, 1929, Cushing's Birthday Book.

DISCUSSION

M. F. Weymann, M. D. (2007 Wilshire Boulevard, Los Angeles).—Doctor Walker first became interested in the relationship between certain forms of retrobulbar neuritis and nasal infection in the latter part of his eye service at the Massachusetts Eye and Ear Infirmary. While on the ear service under Dr. Leon White in 1914, he did his first work in this connection by simple removal of the middle turbinates and ethmoid-sphenoid curettage on some patients obtained from the eye clinic. As these results were encouraging, he described this work to Dr. Leon White and suggested that they do a series of cases in order that he might get further surgical instruction from Doctor White. Before this could be accomplished he was transferred to the service of Doctor Cushing, where all optic neuritis cases were considered due to intracranial pressure. Argument on this subject between Cushing and White has finally led to a concession of some points by each of them, and Doctor Walker has introduced the consideration of multiple sclerosis as an additional factor in his paper.

At the present time there is a tendency by the German and French writers to consider retrobulbar neuritis as a symptom of multiple sclerosis in the majority of cases.

Naturally the work of White in this country was received with favor by rhinologists, as it provided increased surgery for them, and by the ophthalmologists because it gave them some active treatment for retrobulbar neuritis. Sluder would open the sphenoids in such patients just upon finding a little glairy mucus, and I have seen some such patients in whom the immediate improvement was striking. One such patient operated upon for me showed marked improvement in the field *by measurement* on the fourth postoperative day.

Of course those physicians who do not admit that the sphenoids or ethmoids can be the cause of neuritis in the absence of pus would say that this improvement was a coincidence. My own attitude in the

matter is that many patients are unnecessarily operated upon, but that if I were the patient and my vision and field were progressively diminishing in spite of conservative treatment of several days' duration, I should submit to a sinus operation by a competent operator.

The theory that a filterable virus may be a cause in the production of retrobulbar neuritis is not untenable, but it would seem to me more likely that instead of the virus being both a cause of the influenza and the optic neuritis that the influenza or other such illness so weakens the constitutional resistance that a virus already existing in the nasopharynx is able to attack the nerve through dehiscences, or even thinned walls. It has been shown that many individuals carry the virus of herpes, which only becomes active and causes "fever blisters" after some exposure which lowers the resistance, such as febrile disease, sunburn, or mechanical irritation.

This problem of retrobulbar neuritis is still far from solved, but until more definite information is at hand we owe it to our patients and ourselves to take even radical steps, when necessary, with the hope of conserving their vision. There have been too many reports of improvement after sinus operations to disregard this factor entirely and ascribe all cases to multiple sclerosis. Nevertheless, from the evidence presented we can see that many cases are doubtless a manifestation of multiple sclerosis, so conservative therapy should always be given a fair trial.

Doctor Walker is to be commended for his painstaking observations and records, the collection of which has taken more time than we realize.

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DOHRMANN K. PISCHEL, M. D. (490 Post Street, San Francisco).—Is it not possible that European observers have reported such a high percentage of cases of retrobulbar neuritis due to multiple sclerosis because the latter disease is much more prevalent abroad than here in America. If one takes this fact into consideration the differences in the various figures given by observers can be easily understood.

LOW GRADE ETHMOIDITIS—AS A CAUSE OF CERTAIN EYE CONDITIONS*

By WALLACE BRUCE SMITH, M. D.
San Francisco

DISCUSSION *by Dohrmann K. Pischel, M. D., San Francisco.*

THE accessory sinuses of the nose are the subject of a great deal of discussion in the current literature and in the proceedings of the various ophthalmologic and rhinologic societies.

The rhinologists of the past generation worked out the anatomy, pathology, symptoms, differential diagnosis and treatment of acute and chronic accessory sinus diseases. The progress of this work was made through a fog of confusion and was relatively slow. There is still a great deal to learn and some things to unlearn. Closely associated with the rhinologist from the beginning has been the ophthalmologist. In this generation the growth of the idea of focal infection disease added to the importance of sinus disease, in relation to medicine visualized from a large general viewpoint. After the rhinologist and opthalmologist, has come the internist with a whole new crop of conditions whose origin may be referable to the sinuses. The orthopedist came next with his waves of stimuli and the pediatrist is the last from a major field of medicine to refocus attention to sinus infections. So when we have this summation of references to the sinuses we perceive their importance in that highest and most stimulating branch of all medicine, namely, clinical medicine.

It behooves the rhinologist to have an exact knowledge of nose anatomy, pathology and physiology, and he not only should be able to remove the diseased mucous membrane or bone or both, but also to leave the nose in such normal anatomical relation that there will be an ultimate restoration of physiology. It may not always be possible to remove all diseased tissue from the accessory sinuses but it is possible to leave the nose physiologically correct. With the aids of time, climate, diet and attention to the general health we can expect an improvement or healing. Ordinarily there is no operation on the sinuses save that for a concha bullosa, or air cell in the middle turbinate, which requires removal of either lower or middle turbinate. They carry on the main function of the nose as the thumb and index finger carry on that of the hand, and the turbinates should be accorded the same relative importance. Next in importance to their preservation is the necessity for straightness of the septum, which condition should be attained before surgical procedures on any of the sinuses.

ANATOMIC RELATION: THEORIES OF RELATION BETWEEN SINUS INFECTIONS AND TISSUES OF THE EYE

The whole question of sinus infection in relation to disease of the eye is, of course, too large for review in the few minutes allowed for this paper. We know that any eye condition which can be caused by focal infection may and frequently does have the sinuses as the originating focus. So out of the group, there has been selected for your consideration a condition which, on account of the interdependence of oculist and rhinologist, forms ever a high coördination point in our specialties. As such, it is a question of almost unending interest, hard at times to handle, and one in which the results vary directly as the experience and coöperative abilities of the physicians on the case. I refer to retrobulbar neuritis with central scotoma and to ethmoiditis as a cause of retrobulbar neuritis with central scotoma. A mass of literature and controversy comes to mind at the mention of it. One of the best papers in English is by White, who quotes from others at some length as to the manner in which the sinus disease produces the eye condition. The earlier writers stress the anatomic relation between the two. And in any sinus-optic nerve anatomy the name and vision of Onodi must always arise. There are few among you who have not seen, not only one, but many of his plates, in any treatise where head anatomy or accessory sinus anatomy is discussed.

REVIEW OF THE LITERATURE

Theory of Toxemia.—The toxemic or blood stream view started in 1909 by Krauss, who noted

* Read before the Eye, Ear, Nose and Throat Section of the California Medical Association at the Fifty-ninth Annual Session, Del Monte, April 28-May 1, 1930.